

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method for creating virtual private connections between end points in a shared storage area network (SAN), the ~~steps-method~~ comprising: providing a virtual connection architecture and ~~for~~ a host initiator operatively connected thereto, the virtual connection architecture having a virtual connection manager and a virtual connection cache, the virtual connection cache having a list of existing and previously established virtual connections, wherein an existing virtual connection is indicated between a specific host initiator and a specific target storage device, or a specific logical portion thereof, to provide a one-to-one relationship between a host initiator and a target storage device, or a logical portion thereof, for each virtual connection in the virtual connection cache, the host initiator generating and transmitting I/O commands to the virtual connection manager of the virtual connection architecture; comparing, by the virtual connection manager, source and destination information from the I/O commands to a predetermined list of allowable connections; and when the source and destination information matches the predetermined list of allowable connections, determining from the virtual connection cache whether a previously established virtual connection exists between the source and destination; and when the previously established virtual connection does not exist in the virtual connection cache, then determining whether a data connection between the host initiator and a storage device indicated by the destination information is allowable; and creating a data connection between the host initiator and ~~a~~ the storage device, or a logical portion thereof, operatively

connected to the virtual connection architecture, thereby establishing a virtual private SAN; andbut
when the virtual connection exists, using a virtual private SAN indicated by the previously established virtual connection in the virtual connection cache without again determining whether the data connection between the host initiator and the storage device indicated by the destination information is allowable.

2. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 1, wherein multiple virtual private SANs function independently and substantially simultaneously within the shared SAN.

3. (Original) The method for creating virtual private connections between end points in a shared SAN as recited in claim 2, wherein multiple host initiators share a common physical data channel.

4. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 3, wherein the multiple host initiators are provided a protected end-to-end data path.

5. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 2, wherein the multiple, virtual private SANs support at least one SAN connectivity product from the group: hubs, switches, gateways and routers.

6. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 2, wherein the comparing comprises determining a level of access permission for said host initiator.

7. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 6 further comprising storing information representative of at least one of the allowable connections.

8. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 7, wherein the storing comprises storing the information in a virtual connection cache.

9. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 8 further comprising using the information stored in the virtual connection cache to validate subsequent requests for access from the host initiator.

10. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 8, wherein the virtual connection architecture comprises a virtual connection manager.

11. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 2, wherein the multiple virtual private SANs are operable within an existing SAN without need for additional software, middleware, drivers, or modifications to an existing operating system.

12. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 2, wherein the virtual private connections are fully secured independently of the security of each individual host.

13. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 2, wherein the multiple virtual private SANs operate independently of attached storage devices.

14. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 13, wherein the attached storage devices comprise any mixture of legacy or new technology storage devices.

15. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 2, wherein the multiple virtual private SANs operate independently of connection interfaces and provide support for at least one from the group of interfaces: Fibre Channel, SCSI, other SAN interfaces.

16. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 2, wherein the host initiator comprises a host initiator interface for providing a connection to the virtual connection architecture.

17. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 6 further comprising providing a registration engine for receiving a registration command from the host initiator.

18. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 17, wherein the registration command comprises at least one of the commands from the group: full registration, periodic registration, and de-registration commands.

19. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 18, wherein the registration engine comprises a host registration service operating on the host initiator.

20. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 18, wherein the registration

command comprises host and initiator specific information for facilitating automatic identification and configuration of the host and interface.

21. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 17 further comprising periodically monitoring a health status of the host initiator.

22. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 21 further comprising the issuance of a periodic registration command.

23. (Previously presented) The method for creating virtual private connections between end points in a shared SAN as recited in claim 8 further comprising automatically capturing an existing SAN configuration and using the captured configuration information to automatically establish persistent access controls.

24. (Currently amended) An apparatus for creating virtual private connections between end points in a shared storage area network comprising:

means for establishing a virtual connection between a source and a destination, wherein the means for establishing the virtual connection includes a virtual connection manager and a virtual connection cache, the virtual connection cache having a list of existing and previously established virtual connections, wherein an existing virtual connection is indicated between a specific host initiator and a specific target storage device, or a specific logical portion thereof, to provide a one-to-one relationship between a host initiator and a target storage device, or a logical portion thereof, for each virtual connection in the virtual connection cache and determining whether a previously established connection exists does not include determining whether the connection is allowable;

means for receiving I/O commands containing source and destination information;
means for comparing the source and destination information in the I/O commands to
a predetermined list of allowable data connections;
means for creating a virtual private storage area network connection between the
source and destination when the data connection is allowable but does not
exist; and
means for using the virtual private storage area network.

25. (Previously presented) The apparatus of claim 24 wherein when a virtual private storage area network connection is created, storing an indication of the connection in the virtual connection cache.

26. (Previously presented) The apparatus of claim 24 wherein the means for creating a virtual private storage area network connection includes means for determining whether the data connection exists by reading an indication from the virtual connection cache.

27. (New) A method for creating virtual private connections between end points in a shared storage area network (SAN), the method comprising:

providing a virtual connection architecture for a host initiator operatively connected thereto, the virtual connection architecture having a virtual connection manager and a virtual connection cache, the host initiator generating and transmitting I/O commands to the virtual connection manager of the virtual connection architecture; the virtual connection cache having a list of existing and previously established virtual connections, wherein an existing virtual connection between a specific host initiator and a specific target storage device or a specific logical portion thereof provides a one-to-one relationship between the host initiator and the target storage device or the logical portion thereof, thereby allowing the virtual connection manager to execute a

received I/O command immediately without further qualification using the virtual private connection indicated by the previously established virtual connection in the virtual connection cache; and

in the absence of a previously established virtual connection in the virtual connection cache,

comparing, by the virtual connection manager, source and destination information from the I/O commands to a predetermined list of allowable connections; and

when the source and destination information matches the predetermined list of allowable connections,

creating a virtual connection in the virtual connection cache between the host initiator and a storage device, or a logical portion thereof, operatively connected to the virtual connection architecture, thereby establishing a virtual private SAN; and

the virtual connection now existing, using the virtual private SAN indicated by the established virtual connection.